



THE HINDU ANALYSIS

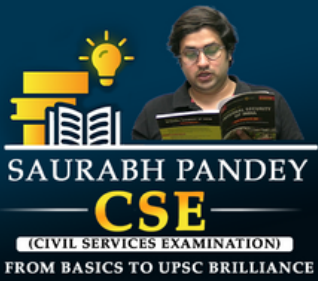
27th Feb 2024

by saurabh
pandey



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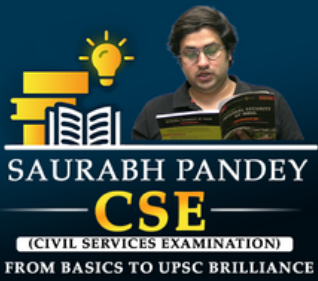


Topic-Quantum computers/singlet fission

- qubit is a physical system with two quantum states, and it is the fundamental physical component of a quantum computer.
- A qubit can exist in one of the two states or – unlike classical computers – a superposed state with contributions from both states .
- . Superposed states, also known as coherent superpositions, are important in quantum information-processing protocols

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- Many qubits, one problem A collection of qubits is required to make a quantum device.
- For this, any group of qubits needs to satisfy a few basic requirements.
- One: the qubits should be identical.
- The qubits can't be guaranteed to be identical since they need to be manufactured, and some 'imperfections' will creep in.
- Two: it should be relatively easy to integrate several qubits that can be operated controllably.
- Here, controllability refers to both the manipulation of individual qubits (a.k.a. "addressability") and qubit-qubit interactions

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The 'colour molecules'

- In the system studied by the Japanese team, zirconium is the metal component and an organic molecule containing the chromophore pentacene bridges the metal atoms.
- A chromophore is an organic molecule or a part of a larger molecule that absorbs light of some specific colour.
- An object containing such molecules thus appears to have some dominant colour.
- For example, the leaves of many plants appear green since the chromophore chlorophyll predominantly absorbs red and blue colours from sunlight.
- Since the presence of chromophores is responsible for the colouration, they are also called "colour molecules".

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- When it absorbs light, the chromophore molecule jumps to a higher energy level (i.e. an excited state).
- In its lowest energy state, or ground state, a chromophore molecule has a pair of electrons in a special configuration called a singlet.
- Every electron possesses a property called spin that is inherent to it.
- The spin of an electron can point in two opposite directions, each corresponding to a distinct quantum state.

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- In a singlet, the spins of the two electrons are pointing in opposite directions.
- If we say ‘pointing up’ is +1 and ‘pointing down’ is -1, we can say the spins in a singlet add up to zero.
- When the chromophore molecule absorbs some light, one of the electrons moves to a higher energy level while their respective spins still point in opposite directions

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Role of singlet \square fission

- An excited molecular system has a small but non-zero chance of releasing its extra energy in a process called deexcitation.
- The higher energy singlet excited state can deexcite to a lower energy triplet excited state.
- The energy released in the process will excite a neighbouring chromophore molecule in a singlet ground state to jump to a triplet excited state.
- This process of generating two triplet excited chromophores from a singlet excited state chromophore is called singlet \square fission.
- This energy transfer happens as the two chromophores interact.

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Baleen whales

- It is one of the earth's most haunting sounds, the "singing" of baleen whales like the humpback, heard over vast distances in the watery realm.
- Now scientists have finally figured out how these filter-feeding marine mammals do it.
- Baleen whales – a group that includes the blue whale, the largest animal – use a larynx, or voice box, anatomically modified to enable underwater vocalisation, researchers said.
- They have evolved a novel structure: a cushion consisting of fat and muscle that sits inside the larynx, the researchers said.

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- That means baleen whales make their sounds with their larynx, as do humans, while toothed whales – including dolphins, porpoises, killer whales and sperm whales – evolved a different mechanism employing a special organ in their nasal passages

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Focus on land management

- the annual losses of ecosystem services due to land degradation has been estimated at \$6 trillion.
- The United Nations Convention to Combat Desertification (COP14) in New Delhi in 2019 specifically discussed the problem of land degradation experienced by different countries and the need to find ways of achieving land degradation neutrality.
- The Intergovernmental Panel on Climate Change's special report on 'Climate Change and Land' (2019) suggested country-level stocktaking of land management practices

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The challenges in India

- India with only 2.4% of world's geographical area and more than 17% of the world population experiences several land management challenges.
- Arable land in India is around 55% of total geographical area and forest cover accounts for another 22%.
- The rest is desert, mountains, etc.
- Around 30% of total geographical area is degraded land.
- Access to agricultural land continues to be an important livelihood issue as a significant share of the population depends on agriculture for their sustenance.
- Development targets and the demand for land to accommodate the growing population, infrastructure, rapid urbanisation, and social, cultural, and environmental aspects are placing unprecedented pressure on land. .

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- This is resulting in more competition among farmers and between agriculture and other land resource-based sectors, as well as land use conflicts, escalation of land prices, and changing land rights.
- Across the country, natural areas are being squeezed and ecological functions being lost.
- Not only does this adversely affect the livelihood opportunities of the people who directly depend on environmental resources, but also the buffering effects of natural ecosystems in the face of disasters such as floods and droughts, temperature rise, and environmental pollution are severely compromised.
- Climate change has brought with it another set of challenges

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STEPS

- In India, current land management practices are sectoral with each department following its own approach.
- Land management falls under the purview of State governments.
- Further, cultural land is privately owned and land-use decisions are constitutionally vested with the owner.
- Apart from this administrative complexity, the challenges to adopt and implement appropriate land management practices in the country include knowledge gaps, a short-term planning bias, a fragmented approach, lack of action for unforeseen events, and regulatory barriers.

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- **As a critical mechanism to achieving sectoral integration and addressing these challenges, it is imperative to set up a multi-stakeholder platform at the district and sub-district levels to bring together farmers, other land managers, policymakers, civil society organisations, business leaders, and investors under a common platform.**
- **Article 243ZD (1) of the Constitution provides for district planning committees to consolidate plans from panchayats and municipalities**

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TOPIC- Tanzania switches on first turbine of hydro unit in World Heritage site

- Tanzania has switched on the first turbine of a new hydroelectric plant set to double power generation capacity.
- conservationists warned that building a dam on a major river that runs through the Selous Game Reserve could affect wildlife and their habitats downstream.
- The reserve is among the largest protected areas in Africa, harbouring one of the most significant concentrations of animals, including elephant, black rhino and cheetah and a large variety of habitats, according to United Nations agency UNESCO.

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- **The Selous Game Reserve, now renamed as Nyerere National Park (in part), is a protected area in southern Tanzania.**
- **It covers a total area of 50,000 km² (19,000 sq mi) and has additional buffer zones.**
- **It was designated a UNESCO World Heritage Site in 1982 due to its wildlife diversity and undisturbed nature**

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Q Why biodiversity conservation and human development cannot co- exist.??

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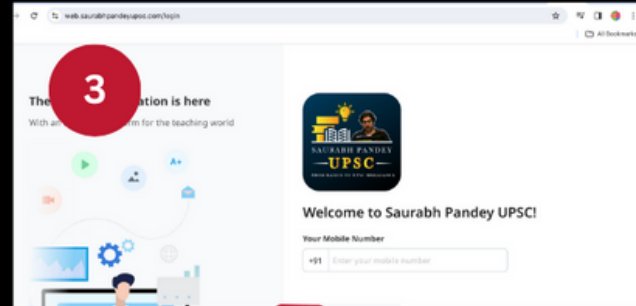
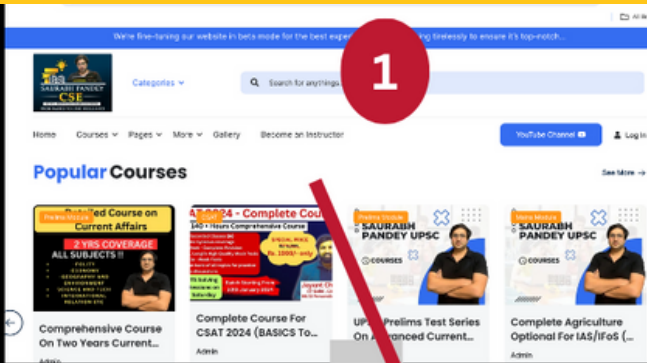
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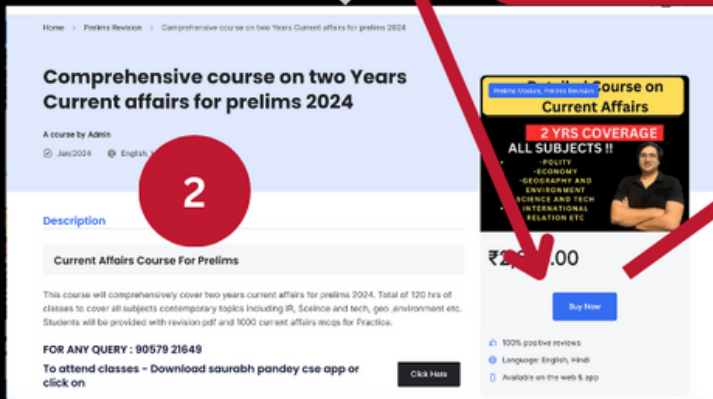
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